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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/509,945	04/04/2000	KAZUYUKI HAMADA	230-148P	8943

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EXAMINER
FOX, DAVID T

ART UNIT	PAPER NUMBER
1638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/509,945	Hamada et al
Examiner	**Group Art Unit**
FOX	1638

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE -3- MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication .
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☑ Responsive to communication(s) filed on 4/2/02.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☑ Claim(s) 1-10 is/are pending in the application.

Of the above claim(s)____ is/are withdrawn from consideration.

☐ Claim(s)____ is/are allowed.

☑ Claim(s) 1-10 is/are rejected.

☐ Claim(s)____ is/are objected to.

☐ Claim(s)____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on____ is/are objected to by the Examiner.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 11 9(a)-(d).

☑ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number)____.

☑ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

*Certified copies not received:____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s).____

☐ Interview Summary, PTO-413

☐ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other____

Office Action Summary

1027, where it is taught that the disclosure of a few gene sequences did not enable claims broadly drawn to any analog thereof.

See *University of California v. Eli Lilly and Co.*, 43 USPQ2d 1398 (Fed. Cir. 1997), which teaches that the disclosure of a process for obtaining cDNA from a particular organism and the description of the encoded protein fail to provide an adequate written description of the actual cDNA from that organism which would encode the protein from that organism, despite the disclosure of a cDNA encoding that protein from another organism.

Claims 1-4 and 7-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for claims limited to a mutant barnase gene comprising SEQ ID NO:3 which encodes a mutant barnase protein which retains its ability to confer male sterility when expressed specifically in anthers but which minimizes deleterious effects on the plant, and to plants transformed therewith, does not reasonably provide enablement for claims broadly drawn to any mutant barnase gene encoding any mutant barnase protein with these characteristics, or plants transformed therewith. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The specification only provides guidance for the production of a single barnase gene mutant, SEQ ID NO:3, which retains its ability to effect male sterility but which allegedly minimizes deleterious agronomic effects. No guidance is provided for the obtention or evaluation of any other mutant barnase gene or its encoded protein. In addition, no guidance is provided for

The request filed on 2 April 2002 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/509,945 is acceptable and a CPA has been established. An action on the CPA follows.

The application should be reviewed for errors. Errors appear, for example, in claims 8 and 9, line 2, where "by" should be replaced with --with--.

Claims 7, 8 and 10 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim must depend on other claims in the alternative only. See MPEP § 608.01(n). Amendment of the claims to insert --one-- after "any" would obviate this objection. Treatment of the claims in the instant Office action, for the purposes of compact prosecution, does not relieve Applicants of the responsibility to respond to this objection.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5 and 6, and dependent claims 7-10, are indefinite in their recitation of "represented by", as it is unclear whether this is an open or closed term, and whether this term implies exact sequence identity. If an open term is intended, replace "represented by" with --comprising--.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-4 and 7-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are broadly drawn to any mutant barnase gene of any sequence encoding any mutant barnase protein of any sequence which retains the ability to effect male sterility when expressed in an anther-specific manner, and plants transformed therewith. However, the specification only provides guidance for a mutant barnase gene comprising SEQ ID NO:3 which encodes a barnase protein of the claimed characteristics.

Given the claim breadth and lack of guidance as discussed above, the specification fails to provide an adequate number of species to demonstrate to one skilled in the art that Applicants were in possession of the broadly claimed genus at the time of the invention. Accordingly, the specification does not provide an adequate written description of the claimed invention.

See Amgen Inc. v. Chugai Pharmaceutical Co. Ltd., 18 USPQ 2d 1016 at 1021 and 1027, (Fed. Cir. 1991) at page 1021, where it is taught that a gene is not reduced to practice until the inventor can define it by "its physical or chemical properties" (e.g. a DNA sequence), and at page

the identification of specific factors or sequences in a barnase gene or encoded protein which would ensure sterilty induction while minimizing other unwanted whole plant effects. In contrast, the claims are broadly drawn to any mutant barnase gene of any sequence encoding any barnase protein of any sequence, and plants transformed therewith.

The behavior of barnase genes in plants is upredictable. See Reynaerts et al, page 136, penultimate paragraph and page 138, first full paragraph, who teach incomplete effects of the barnase gene on male sterility in lettuce, and who teach the deleterious effects of barnase on the whole plant, due to leaky anther-specific promoters and/or position effects.

Mutating barnase genes for retention of barnase activity, while avoiding phytotoxic effects, is upredictable. Jucovic et al teach that mutation of the barnase gene can lead to inactive mutants which do not produce an active ribonuclease enzyme (see, e.g., page 497, Abstract).

Given the claim breadth, unpredictability, and lack of guidance as discussed above, undue experimentation would have been required by one skilled in the art to identify, develop and evaluate a multitude of non-exemplified barnase gene mutants for their ability to encode a barnase protein which retains is ability to effect male sterility while minimizing other adverse whole plant effects.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4 and 7-10 are rejected under 35 U.S.C. 102(a) as being anticipated by WO 98/37211 (GENE SHEARS).

GENE SHEARS teaches plant transformation with a DNA construct comprising an anther-specific promoter and barnase gene for male sterility induction, and transformed plants which contain said DNA construct (see, e.g., page 12, lines 19-21; page 26, lines 8-10; page 28). According to the Sequence Search results (attached to reference), the barnase gene of GENE SHEARS is missing the first 7 nucleotides present on the wild-type barnase gene, and also contains some sequence substitutions in positions 9 and 11. Accordingly, this barnase gene constitutes a "substitution or deletion" mutant of the wild-type barnase gene. The ability of the mutated gene to mimize deleterious plant effects, particularly when inserted into an area of lower transcriptional activity or an area without inherent enhancer elements, would have been inherent.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claims 1-4 and 7-10 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 96/26283 (PLANT GENETIC SYSTEMS).

PLANT GENETIC SYSTEMS teach plant transformation with a DNA construct comprising an anther-specific promoter and barnase gene for male sterility induction, and transformed plants which contain said DNA construct (see, e.g., Abstract). According to the

Sequence Search results for U.S Patent 6,025,546 corresponding to PLANT GENETIC SYSTEMS (attached to the reference above), the barnase gene of PLANT GENETIC SYSTEMS has subsitutions at positions 337-339 and 341 of the wild-type barnase gene (correspoding to "Db" strand after position 333, which was deleted in the "Qy" strand). Accordingly, this barnase gene constitutes a "substitution" mutant of the wild-type barnase gene. The ability of the mutated gene to mimize deleterious plant effects, particularly when inserted into an area of lower transcriptional activity or an area without inherent enhancer elements, would have been inherent.

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Serrano et al.

Serrano et al teach a mutant barnase gene encoding a "binase" protein, said binase comprising substitutions at several amino acid residues, said binase retaining its ability to encode a ribonuclease (and thus inherently retaining its ability to effect male sterility when expressed in an anther-specific manner), and said binase being less active with respect to certain ribonucleotides, thus inherently minimizing adverse effects on transformed plants (see, e.g., page 306, column 1; page 307, column 2, second full paragraph; page 308, Table 4; page 309, column 2, middle paragraph).

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Jucovic et al.

Jucovic et al teach a mutated barnase gene encoding an active ribonuclease which would inherently possess the ability to effect male sterility when expressed in an anther-specific manner (see, e.g., page 498, column 2, first and second full paragraphs; page 499, column 1, second full

paragraph). The barnase gene would be inherently less phytotoxic when inserted into a more transcriptionally quiet region of the genome, or one without enhancer elements.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/26283 (PLANT GENETIC SYSTEMS) taken with Serrano et al, in view of Jucovic.

PLANT GENETIC SYSTEMS teaches plant transformation with a barnase gene under the control of an anther-specific promoter for the obtention of male sterile plants as discussed above, and also teach the deleterious effects on whole plant growth due to position effects (see, e.g., page 19, line 30 through page 20, line 5; page 20, lines 12-19).

PLANT GENETIC SYSTEMS does not teach transformation with a mutant barnase gene encoding a barnase with lower activity.

Serrano et al teach a mutated barnase gene, "binase", encoding a ribonuclease which has lower activity against some ribonucleases, as discussed above.

Jucovic et al teach the deleterious effects of barnase expression on general cell and tissue health (see, e.g., page 498, column 2, second full paragraph; page 499, paragraph bridging the columns).

It would have been obvious to one of ordinary skill in the art to utilize the method of plant transformation with a barnase gene under the control of an anther-specific promoter to generate male sterile plants as taught by PLANT GENETIC SYSTEMS, and to modify that method by incorporating the mutated barnase gene taught by Serrano et al, as suggested by PLANT GENETIC SYSTEMS and Jucovic et al.

Claims 5 and 6 are deemed free of the prior art, given the failure of the prior art to teach or suggest a mutant barnase gene of SEQ ID NO:3.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David T. Fox whose telephone number is (703) 308-0280. The examiner can normally be reached on Monday through Friday from 10:30AM to 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached on (703) 306-3218. The fax phone number for this Group is (703) 872-9306. The after final fax phone number is (703) 872-9307.

June 11, 2002

DAVID T. FOX
PRIMARY EXAMINER
GROUP 180 1638